**Directions: Use your online textbook (8.1) and a calculator to answer the following questions. Work independently or in a cooperative group of no more than four people. Turn in to basket with names clearly marked when complete.**

1. You have just been offered a job that will last one month. You have two salary options. You can either receive one penny for your first day on the job, and then double the previous day’s pay for each of the remaining 30 days (Option A), or you can receive $10/week with a $5/week raise every week (Option B). Which salary option would you prefer? Show you work below to justify your answer. Then describe how each scenario is similar to the two ways (linear or arithmetic growth VS. exponential growth) populations can increase in size

2. Execute the “QUICKLAB” entitled “Population Growth” on page 198 in the online textbook. Instead of using 100g or dry beans, take a piece of scrap paper from the basket under the clock and cut out approximately 100 small squares. You will use these small squares to model the population growth – follow the procedures and fill in the table below:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| Starting |  |  |  |  |  |  |  |  |  |  |
| Births |  |  |  |  |  |  |  |  |  |  |
| Deaths |  |  |  |  |  |  |  |  |  |  |
| **Ending** |  |  |  |  |  |  |  |  |  |  |

Finally, **make a graph of your data below and describe** the type of population growth based on the shape of the curve (linear or exponential?). Make sure to clearly label your X axis and Y axis (Year Vs. # of individuals). See graph on pg. 199 for an example.

Graph:

3. Population density is the number of individuals per unit area or volume, such as the number of bass per cubic meter of water in a lake. Consider 12 rattle snakes in 2m X 2m area. Calculate the population density of the rattle snakes per square meter. Calculate the population density per square meter of 12 box turtles in a 4m X 4m area. Which situation has a higher population density and why? Show your work and diagram each situation below:

4. Describe how growth rates for a population can be positive, negative, or zero.

5. Why is the reproductive potential of bacteria considered to be much higher than the reproductive potential of a bowhead whale? Be sure to correctly include the phrase “generation time” in your explanation.

6. Read the “ECOFACT” on pg. 200 in the online textbook. Provide a hypothesis that explains why the reindeer population on the Pribilof Islands went from 25 in 1911, up to 2,000 in 1938, and then crashed to only 8 by 1950. Is this similar or different to what happened when rabbits were introduced into Australia in 1859?

7. How could a population size be affected by immigration and emigration? (use a dictionary to look up these terms!)

8. Read the “Connect to MATH” activity on pg. 201, and complete the table below with your answers:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** |
| Starting Population |  |  |  |  |  |  |
| Births |  |  |  |  |  |  |
| Deaths |  |  |  |  |  |  |
| Ending Population |  |  |  |  |  |  |
| Growth Rate |  |  |  |  |  |  |
| % Change  (=Growth Rate/Starting Population) |  |  |  |  |  |  |

9. In what ways are disease and predation density-dependent?

10. What are some examples of resources that could determine carrying capacity in an ecosystem?

11. Cite an example of a density-independent change to a population.